

FCG/EEC-1/EEG(t)/EWG(a)-2/EWG(c)/EWA(h) Pe-5/Pi-1/Po-1/Pq-1/Pac-1/Pae-2/Peb  
TT/DD/ENS/RB/QW

ACCESSION NR: AP5011557

UR/0026/65/000/004/0046/0053

91  
B

AUTHOR: Antipov, V. V. (Candidate of medical sciences); Nikitin, M. D.; Saksonov, P. P.  
P. (Doctor of medical sciences)

TITLE: Biological evaluation of the radiation hazard during manned lunar flights

SOURCE: Priroda, no. 4, 1965, 46-53

TOPIC TAGS: manned space flight, radiation biologic effect, radiation protection,  
solar flare, space radiation, cosmic ray, space radiation hazard, space medicine,  
radiation belt ✓

ABSTRACT: Since it is likely that the Moon will be the first celestial body to be  
visited by manned space probes, the problem of the radiation hazard in the  
Earth-Moon trajectory is of great importance. In this connection, the phys-  
ical parameters of the natural and artificial radiation belts of the Earth and  
of solar flare radiation are enumerated.

In a discussion of the radiobiological effects of cosmic radiation, it  
is stated that when a cosmonaut protected with 3 g/cm<sup>2</sup> is exposed to radia-  
tion from a large solar flare, the dose absorbed will range from tens to

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ACCESSION NR: AP5011557

several hundred rads. Under terrestrial conditions, a 25-rem dose strongly affects the hematological and central nervous systems of man, 100 rem evoke nausea, increased fatigability, and other symptoms which generally lower working capacity, 200 rem produce symptoms of severe radiation sickness in 50% of the cases, and 300 rem are fatal.

It is likely that space-flight factors alter the reaction of the organism to the effects of ionizing radiation although it is difficult to determine the exact mechanisms of this phenomenon. A radiobiological effect depends basically on the integral absorbed dose, the type of radiation, the magnitude and duration of dose, and whether the organism has been partially or totally irradiated. The functional condition of the organism also determines its resistance to radiation. The relative biological effectiveness (RBE) of protons has been found to be around 1.5. However, when cosmonauts are exposed to radiation from solar flares, a significant component of the dose will be made up of neutrons whose RBE is no less than 2.0.

The fact that space-flight factors complicate the reaction of the organism to irradiation makes it more difficult to determine permissible dose values. In addition, the likelihood that cosmonauts on a one-week lunar flight will be exposed to radiation from solar flares is high. For in-

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stance, there is a 16% chance of exposure to radiation from a flare of the type observed on 22 August 1958, a 5.8% chance of exposure to a flare like that of 10 May 1959, and a 0.3% chance of exposure to a flare like that of 23 February 1958. These flares occurred during a period of increased solar activity.

In calculating the integral dose from primary cosmic radiation and from radiation from the natural and artificial belts around the Earth, it is anticipated that a value of 10 rem would not be exceeded in a two-week flight during a quiet-sun period if cosmonauts were protected with  $1-2 \text{ g/cm}^2$ . This value would have to be increased to  $3 \text{ g/cm}^2$  to lower the dose to 25 rem from protons from a flare similar to the one on 22 August 1958. It would be virtually impossible to achieve physical protection from flares of the type which occurred on 10 July 1959 and 23 February 1956.

Two methods exist for decreasing the radiation hazard from protons. The first method involves the forecasting of solar flares, which at the present time can be achieved with up to 75% accuracy for 2-3 days ahead. Since this is not a long period of time, the problem of forecasting flare activity must be examined more thoroughly in terms of developing hardware for this

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purpose which can be used both on Earth and in the spacecraft. The second method is to increase the resistance of the organism to the effects of radiation by means of different medical preparations. Successful experiments in this field have increased hopes that the medical protection of cosmonauts from ionizing radiation will be one of the prime factors in a radiation safety system. Orig. art. has 2 tables, 1 graph, and 4 figures.

ASSOCIATION: none

SUBMITTED: 00

ENGL: 00

SUB CODE: AA, IS

NO REF SOV: 001

OTHER: 000

ATD PRESS: 1004-F

Card



L 25978-00 ENT(1)/ENT(M)/FCG/ENR(H) SCIB DD/RD/GW

ACC NR: AT6003847

SOURCE CODE: UR/2865/65/004/000/0119/0126

AUTHOR: Saksonov, P. P.; Antipov, V. V.; Dobrov, N. N.; Shashkov, V. S.;  
Kozlov, V. A.; Parshin, V. S.; Davydov, B. I.; Razgovorov, B. L.;  
Morozov, V. S.; Nikitin, M. D.

ORG: none

6.8

B+1

TITLE: Perspectives of pharmacochemical protection from radioactive  
damage during cosmic flights

SOURCE: AN SSSR. Otdeleniye biologicheskikh nauk. Problemy  
 kosmicheskoy biologii, v. 4, 1965, 119-126

TOPIC TAGS: astronaut, space medicine, radiation biologic effect,  
 antiradiation drug, biologic acceleration effect, mouse, *experiment animal,*  
*space physiology, closed ecology system, space flight*

ABSTRACT: The authors consider cosmic radiation a real danger for  
 astronauts, particularly during long flights. The work is a survey on  
 existing radioprotectors and a general discussion of biologic conditions  
 in cosmic flight, future research, and requirements for radioprotectors.  
 The present chemical compounds, Mercamine HCL, its salicylate and  
 disulfide, and AET appear sufficiently effective for clinical use against

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L 23976-66

ACC NR: AT6003847

X or gamma rays. Laboratory tests on mice showed that some compounds of the aminothiols series (cystamine, cysteamine, serotonin, AET) exerted significant protective effect in proton irradiation of 600 and 120 Mev. In the search for radioprotectors, other factors affecting the astronaut must also be taken into account, such as weightlessness, vibration, acceleration and changes in pressure. Tests on laboratory animals subjected to such conditions prior to irradiation showed no effect on radiation sickness, but vibration after irradiation was apt to prolong the sickness. Some of the radioprotectors tested in mice and dogs had an adverse effect on stability of the organism under vibration and acceleration. The authors call for studies to establish a stable ecologic system in the cabin which can accompany the astronaut on long trips, for models simulating cosmic flight conditions particularly in regard to radiation dose, and for radioprotective compounds to be compatible with all these conditions. Orig. art. has: none.

SUB CODE: 06, 22/ SUBM DATE: none/ ORIG REF: 040/ OTH REF: 028

Card 2/2 ✓

I. 24370-66 FSS-2/ENT(1)/ENT(m)/EEC(k)-2/FCG/ENA(h) SCTB TT/DD/GN 2C  
 ACC NR: AT6003848 SOURCE CODE: UR/2865/65/004/000/0127/0138 77

AUTHOR: Volynkin, Yu. M.; Antipov, V. V.; Guza, V. A.; Nikitin, K. D.; Saksonov, P. P. 571

ORG: Department of Biological Sciences, Academy of Sciences USSR (AN SSSR. Otdeleniye biologicheskikh nauk)

TITLE: Biological evaluation of radiation conditions for earth to moon flight 12 2

SOURCE: AN SSSR. Otkeleniye biologicheskikh nauk. Problemy kosmicheskoy biologii, v. 4, 1965, 127-138

TOPIC TAGS: bioastronautics, space radiation, solar flare, irradiation dosimetry, radiation shielding

ABSTRACT: The physical characteristics and maximum permissible biological doses of the basic types of cosmic radiation are considered. Radiation doses for primary cosmic radiation from natural and artificial belts with a radiation shield of 1 to 2 g/cm<sup>2</sup> should not exceed 10 rem for a two week flight around the moon. In case of an emergency return from an altitude of 75,000 km by the least favorable trajectory, the maximum dose would probably be about 20 rem and a radiation shield of 1 to 2 g/cm<sup>2</sup> would still provide adequate radiation protection for crew

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L 2437C-66

ACC NR: AT6003848

members. Proton radiation of solar flares represents a real threat to the health and lives of astronauts. To protect astronauts from solar flares of the type witnessed Aug. 22, 1959, the radiation shield may be increased to 3 g/cm<sup>2</sup>. However, the problem of protection against solar flares of the type witnessed July 10, 1959 and February 23, 1956 cannot be solved technically at this time. The safety of the astronaut can also be increased with the use of solar flare forecasts. Present forecasting methods predict the appearance of solar flares 2 to 3 days in advance with 75% accuracy. Improved forecasting methods should be accompanied by the development of new types of forecasting instruments. Increasing body resistance to proton radiation of solar flares with the use of various pharmaceutical chemical preparations appears promising. Orig. art. has: 2 tables.

SUB CODE: 06/ SUBM DATE: none/ ORIG REF: 021/ OTH REF: 020

Card 2/2 *W*

L 14245-66 FSS-2/EWT(1)/EWA(j)/FS(v)-3/EEC(k)-2/EWA(d)/T/EWA(b)-2 SCTB TT/DD/JK/RD  
ACC NR: AT6003860 GW SOURCE CODE: UR/2865/65/004/000/0261/0269

AUTHOR: Zhukov-Verezhnikov, N. N.; Rybakov, N. I.; Kozlov, V. A.; Saksonov, P. P.;  
Dobrov, N. N.; Antipov, V. V.; Podoplelov, I. I.; Parfenov, G. P.

ORG: none

TITLE: Results of microbiological and cytological investigations conducted  
during the flights of "Vostok" type vehicles

SOURCE: AN SSSR. Otdeleniye biologicheskikh nauk. Problemy kosmicheskoy biologii,  
v. 4, 1965, 261-269

TOPIC TAGS: bacteria, genetics, bacterial genetics, gamma irradiation, cobalt,  
radioisotope, microbiology, cytology, space biologic experiment, radiation  
biologic effect, biologic vibration effect

ABSTRACT: The biological objects used for space research are carefully selected  
genetic indicators. E. coli K-12 ( $\lambda$ ), frequently chosen for these experi-  
ments, is a reliable biological dosimeter of the genetic effectiveness of  
spaceflight factors. When normal and cancerous human cells were exposed  
in the Vostok series, it was found that these experimental samples did not  
differ essentially from control samples kept on earth. However, some  
tendency to intensification of phage production was observed in cultures.

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L 14245-66

ACC NR: AT6003860

gamma-irradiation (dose, 100 rad; dose power, 21 rad/min). The experimental results show that vibration alone does not induce phage production but does increase the sensitivity of lysogenic bacteria to the subsequent influence of gamma-irradiation. It is suggested that vibration helps sensitize cells of a lysogenic culture to the influence of cosmic radiation, although it is also possible that the cause of genetic changes is weightlessness in combination with radiation. Orig. art. has: 1 figure and 4 tables.  
[ATD PRESS: 4091-F]

SUB CODE: 06 / SUBM DATE: none / ORIG REF: 009 / OTH REF: 002

FW  
Card 3/3



L 14291-66 EWT(m)/ETC(F)/EPF(n)-2/EWG(m) GG/RD

ACC NR: AT6003875

SOURCE CODE: UR/2865/55/004/000/0411/0429

AUTHOR: Razgovorov, B. L.; Morozov, V. S.; Shashkov, V. S.; Antipov, V. V.;  
Dobrov, N. N.; Konnova, N. I.; L'vova, T. S.; Saksonov, P. P.

ORG: none

TITLE: Effect of screening individual parts of the body of animals on changes  
in radiation reaction on exposure to gamma rays and high-energy protons.

SOURCE: AN SSSR. Otdeleniye biologicheskikh nauk. Problemy kosmicheskoy  
biologii, v. 4, 1965, 411-429

TOPIC TAGS: radiation shielding, RBE, rat, animal physiology, gamma irradiation,  
cobalt, radioisotope, proton, irradiation, radiation biologic effect

ABSTRACT: Previous experiments showed that screening of individual organs or  
parts of the body during large doses of x-rays or gamma rays can change  
both the degree of radiation sickness and the number of deaths. In this  
work experiments were conducted to determine the effect of screening  
during irradiation of animals with gamma rays and 120-Mev protons.

White rats of both sexes were used. Co<sup>60</sup> gamma irradiation with dose  
power of 15.5 r/min was used. Proton irradiation was conducted through  
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ACC NR: AT6003875

lead-shielded polyethylene blocks to lower the dose (dose power  $60 \pm 10$  rad/min). During gamma irradiation, parts of the body were screened with steel plates (15 cm thick) of different widths. Plexiglas blocks 12—15 cm thick, which almost completely blocked the proton flux from the screened part, served as shields during proton irradiation. The biological effect of radiation under these conditions was determined by the survival rate of animals during a 30-day period after irradiation. Localized shielding during gamma irradiation of rats in a dose of 930 rad produced a definite increase in the survival rate, which was most effective during screening of the abdomen (80% survival rate as compared with 6% in the control). It was concluded that screening of the abdomen lowers the mortality index to the greatest degree and also is most effective in easing the course of radiation sickness and lessening the degree of leukopenia.

In a second series of experiments, the abdomens of rats were shielded with plexiglas blocks of different widths during irradiation with protons in the following dose ranges: 800—1050 rad and 1100—1300 rad, and with gamma rays in doses of 930, 1100, and 1400 rad. It was found that screening the abdomen with a block 6 cm wide during proton irradiation with

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ACC NR: AT6003875

800—1050 rad increased the survival rate to 86.4% (as compared with 19.4% in the control). A high survival rate (96.7—100%) was also observed when the abdomen was screened with blocks of various widths during gamma irradiation (930 rad). Screening of the abdomen during proton irradiation also prevented the development of severe gastrointestinal disease in many cases and caused rats to lose less weight. Experimental animals recovered weight more quickly and even exceeded initial weight levels. Weight changes during gamma irradiation followed the same pattern.

Preliminary experiments were also conducted to show the effect of screening under the combined influence of protons and acceleration or vibration. Results showed that neither 30 min of acceleration (10g) nor 1 hr of vibration (700 cps, amplitude 0.005 min) altered the effectiveness of screening during proton irradiation (doses 750—1100 rad and 1050—1300 rad, respectively). Furthermore, it was found that the effectiveness of screening the abdomen increases with increased radiation dose. There is not yet any adequate explanation of the screening effect although it may be connected with retention by the organism of undamaged tissue sections.

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L 14291-66

ACC NR: AT6003875

Orig. art. has: 5 figures and 4 tables. [ATD PRESS: 4091-F]

SUB CODE: 06 / SUBM DATE: none / ORIG REF: 011 / OTH REF: 010

CC  
Card 4/4

L 14292-66 EWT(m)/EPF(n)-2 --GG/RD

ACC NR: AT6003876

SOURCE CODE: UR/2865/65/004/000/0430/0436

AUTHOR: Gaydamakin, N. A.; Petrukhin, V. G.; Shashkov, V. S.; Antipov, V. V.; 5/  
Saksonov, P. P. BT/

ORG: none

TITLE: Morphological changes in the hematopoietic organs of mice after irradiation with high-energy protons 19, 24, 51.

SOURCE: AN SSSR. Otdeleniye biologicheskikh nauk. Problemy kosmicheskoy biologii, v. 4, 1965, 430-436

TOPIC TAGS: proton, hematopoesis, RBE, morphology, irradiation, mouse, gamma irradiation, cobalt, radioisotope, ionizing irradiation, radiation biologic effect

ABSTRACT: Pathological changes in the morphology of the hematopoietic organs of male mice were studied after proton and gamma-irradiation. Some animals were subjected once to proton irradiation (dose, 830 rad; dose power, 400—600 rad/min), and others were irradiated from a Co<sup>60</sup> source (dose, 650 r; dose power, 273 r/min). Control animals were not irradiated. The mice were killed with ether 3, 7, 15, 30, and 60 days after irradiation, and cells of the spleen, thymus gland, and bone marrow of the femur were

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L 14292-66

ACC NR: AT6003876

examined microscopically. In animals that died from radiation sickness (9—12 days after irradiation), hemorrhages in the lungs and intestine were frequently observed. Comparison of the weight coefficients of the spleen and thymus (both showing a two-phase increase) did not reveal any statistically reliable differences in the effects of the two different types of irradiation on these organs. Observation of animals and comparative study of hematopoietic organs show that changes due to irradiation with protons and gamma-rays are similar. In the first few days after irradiation, the volume of follicles in the spleen decreased, and areas of myelopoiesis disappeared from the pulp. In the thymus gland, depletion of the cortical substance of lymphocytes was observed, and in the bone marrow destruction of the reticular stroma occurred. It must be noted that changes were less severe during irradiation with protons than with gamma-rays. However, complete recovery of the spleen did not occur in either case by the 60th day after irradiation. In general, it was concluded that restorative processes in all three structures studied proceeded more slowly in the gamma-irradiated animals. Previous experiments have also shown that there are no noticeable differences in the morphological

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L 14292-66

ACC NR: AT6003876

reactions of animals to different types of ionizing radiation. The degree of affliction, however, depends on the physical nature of the form of radiation, and doses vary. Orig. art. has: 1 table. [ATD PRESS: 4091-F]

SUB CODE: 06 / SUBM DATE: none / ORIG REF: 013 / OTH REF: 004

PC  
Card 3/3

L 14295-66 EWT(m)/EPF(n)-2 GG/RD

ACC NR: AT6003878

SOURCE CODE: UR/2865/65/004/000/0445/0450

AUTHOR: Zhukov-Verezhnikov, N. N.; Volkov, M. N.; Rybakov, N. I.; Saksonov, P. P.;  
Kozlov, V. A.; Konstantinov, P. A.; Antipov, V. V.; Dobrov, N. N.; Aniskin, Ye. D.

ORG: none

19,44,55  
TITLE: New ways of studying chemical protection against genetic changes 32  
B+1

SOURCE: AN SSSR. Otdeleniye biologicheskikh nauk. Problemy kosmicheskoy biologii, v. 4, 1965, 445-450

TOPIC TAGS: bacteria, x ray irradiation, bacterial genetics, chemical agent

ABSTRACT: Aminothiols and some pyrimidine analogs were tested for their ability to block development of infectious phage from prophage after induction of E. coli K-12 ( $\lambda$ ) with x-rays. Doses with a previously established non-toxic effect (0.05% concentration) were used. The desired chemical preparation was added to a bacterial culture diluted in a physiological medium. Experimental and control samples were subjected to x-ray irradiation (dose, 15,000 r) and then cultured on agar. The number of induced phage particles in irradiated samples with and without each preparation was then compared. 2-Mercaptopropylamine hydrochloride was

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L 14295-66

ACC NR: AT6003878

most effective; cultures treated with it produced 119 times fewer phage particles than control samples. Other good inhibitors of induced phage formation were 2-(gamma-aminopropyl) disulfide dihydrobromide, sodium diethyldithiocarbamate and ammonium dithiocarbamate, which reduced phage production 76.3—70.1 times. Less effective were the salts of  $\beta$ -mercaptoethylamine tested: 2-mercaptoethylamine hydrobromide, 2-mercaptoethylamine disulfide hydrochloride, 2-mercaptoethylamine hydroiodide, and 2-mercaptoethylamine hydrochloride.

The experimental data show the essential connection between the chemical structure of the tested preparations and their ability to block the development of infectious phage. The antigenetic effect of  $\beta$ -mercaptoethylamine preparations is determined by their acid radicals as well as by their base. It may be possible to obtain even more effective preparations of this compound by forming salts with other acids. The failure of 3- $\beta$ -aminoethylisothiuronium hydrobromide to produce an antigenetic effect is especially interesting because in previous experiments this compound decreased the death rate of animals subjected to a lethal radiation

dose by 70-100%. Orig. art. has: 1 table. [ATD PRESS: 4091-F]  
SUB CODE: 06 / SUBM DATE: none / ORIG REF: 013 / OTH REF: 003  
Card 2/2

L 14294-66

ACC NR: AT6003881

tained in the second generation. However, preparation P-46 completely removed the injurious radiation effect in that generation. Experimental data indicate the possibility of partially or completely removing the depressing effect of  $\beta$ -radiation on plants with the help of physiologically active compounds. Orig. art. has: 4 tables. [ATD PRESS: 4091-F]

SUB CODE: 06 / SUBM DATE: none / ORIG REF: 004 / OTH REF: 005

CC  
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L 11252-66 FSS-2/EWT(1)/FS(s)/ENP(m)/FS(v)-3/EEC(k)-2/FCC/EWA(h) SCTB TT/2D/RD/GW  
ACC NR: AT6003911

SOURCE CODE: UR/2865/65/004/000/0701/0708

AUTHOR: Morosov, V. S.; Shashkov, V. S.; Davydov, B. I.; Antipov, V. V.;  
Saksonov, P. P.; Dobrov, N. N.

84  
82

ORG: none

TITLE: Modeling of radiation conditions on a circumlunar trajectory during a solar flare

SOURCE: AN SSSR. Otdeleniye biologicheskikh nauk. Problemy kosmicheskoy biologii, v. 4, 701-708  
1965

TOPIC TAGS: space flight simulation, mouse, radiation protection, lunar flight, radiation biologic effect, biologic acceleration effect, solar flare, gamma irradiation, lunar trajectory, radiation belt, antiradiation drug

ABSTRACT: The possibility of modeling the biological effect of radiation on a lunar flight which includes a short solar flare was demonstrated. White mice fed a special food concentration and kept in a biological unit were subjected to gamma-irradiation. Acute irradiation of other animals was conducted in plexiglas cages. In all cases the radiation dose was

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I 11252-66

ACC NR: AT6003911

2

900--920 r. Dose power during acute irradiation was 18 r/min and during "solar flare" a maximum of 2.5 r/min (duration of flare, 24 hr). On the simulated lunar trajectory, the animals received a dose of 60--80 r while passing through the "radiation belts." Before the solar flare, the mice were injected with the following radioprotective agents: cystamine dihydrochloride, AET, and 5-methoxytryptamine hydrochloride. 4/

The experimental results showed that the effects of this pharmacological protection were slight as compared with unprotected animals. AET was the most effective radioprotective agent during both "lunar flight" and acute irradiation. On the lunar flight the animals were subjected to an acceleration of 20 g for 5 min before irradiation and at the end of the flight. It is suggested that the observed lowering of the biological effect of radiation during lunar flight (only 33% of the mice died, as against 90% after acute irradiation) is due not only to the lowered dose power, but also to acceleration. It is known that acceleration can alter the reactivity of an animal to subsequent irradiation. Previous experiments also suggest that preliminary irradiation of 60 r (in the radiation

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L 14252-66

ACC NR: AT6003911

belts) reduced the effectiveness of the subsequent high dose during solar flare.  
It was concluded that modeling of radiation conditions for any spaceflight  
trajectory should be possible. Orig. art. has: 2 figures and 3 tables.

[ATD PRESS: 4091-F]

SUB CODE: 06 / SUBM DATE: none / ORIG REF: 006 / OTH REF: 006

FW  
Card 3/3

L 15406-66 FSS-2/EWT(1)/FS(s)/FS(v)-3/EEC(k)-2/FCC/EWA(h) TT/ENS/GW

ACC NR: AP6000625

SOURCE CODE: UR/0209/65/000/012/0026/0028

AUTHOR: Antipov, V.; Dobrov, N.; Nikitin, M.; Saksonov, P.

ORG: None

TITLE: The radiation barrier on the way to the moon

SOURCE: Aviatsiya i kosmonavtika, no. 12, 1965, 26-28

TOPIC TAGS: solar radiation effect, space radiation hazard, radiation biologic effect, cosmonaut

ABSTRACT: The authors discuss the possibly dangerous effects of the ionizing radiation associated with chromospheric solar bursts that may be encountered in radiation belts by manned deep-space probes. The composition of primary cosmic radiation is discussed, and it is pointed out that this radiation can be tolerated by astronauts in doses of from 125—270 mb per 24-hr period, depending on the nature of the solar activity during that period. Also considered is the radiation of the internal and external radiation belts. It is shown that this form of radiation also poses no real threat to the health of the cosmonaut under normally anticipated conditions. Of considerably greater interest from the standpoint of an Earth-Moon flight is the radiation which arises in association with chromospheric bursts.  
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L 15406-66

ACC NR: AP6000625

on the Sun. This form of radiation contains approximately 90% protons and 10% alpha-particles. The protection-to-dosage ratios for this radiation are discussed, the possible effects of specific dosages on the living organism of a cosmonaut located within such a sun-burst stream are analyzed, and an attempt is made to estimate the probability of a space vehicle's encounter with this form of radiation. The authors conclude that, with a properly selected flight trajectory, adequate protection against solar-burst-originated protons, effective dosimetric controls and reliable sun-burst prediction techniques, the radiation barrier on deep-space probes, and particularly on an Earth-Moon mission, can be successfully and safely penetrated.

SUB CODE: 06,18 / SUBM DATE: none

CC  
Card 2/2

L 29511-65 EWG(j)/EWG(r)/EWT(1)/EWG(v)/EWG(a)/EWG(o)/FS(y)-3 Pg-5 DD/RD

ACCESSION NR: AP5005444

S/0293/65/003/001/0159/0166

AUTHOR: Davydov, B. I.; Antipov, V. V.; Saksonov, P. P.

TITLE: Reaction of the irradiated organism to critical accelerations ✓ 42  
b

SOURCE: Kosmicheskiye issledovaniya, v. 3, no. 1, 1965, 159-166

TOPIC TAGS: x irradiation, acceleration, acceleration effect, radiation effect, mouse, acceleration adaptation; centrifugation

ABSTRACT: A study has been made of the effects of radiation on the ability of male mice to withstand critical magnitudes of acceleration. In all, 1400 animals were studied. In evaluating the viability of animals exposed to acceleration, their condition was determined after exposure. The purpose of using an extremely high acceleration was to reveal those subtle and unstable compensatory mechanisms which are not ordinarily apparent. Animals were irradiated in an RUM-11 device in doses of 250, 500, 700, and 850 r (13 r/min) and then exposed to accelerations of 40-42 g for 3 min in a back-to-chest position. The radius of the centrifuge was 0.31 m. At these accelerations, approximately 50% of the control animals died. Any trend which differed from this figure was used as an index of changes in stability on the part of the irradiated animals. Some results of the experiments are given in Table 1 and Figs. 1, 2, 3, and 4 of the Enclosure. The authors concluded that mice Card 1/12

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became more tolerant of acceleration 1—7 days after exposure to 250, 500, and 700 r. There is a relationship between the irradiation dose and the acceleration tolerance. Control animals exposed to preliminary centrifugation showed increased resistance to repeated accelerations which was not observed in animals irradiated with 760 r on the first day after exposure. Orig. art. has: 2 tables and 6 figures.

[CD]

ASSOCIATION: none

SUBMITTED: 09Jul64

ENCL: 05

SUB CODE: PH,LS

NO REF SOV: 007

OTHER: 012

ATD PRESS: 3197

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L 38550-65 EWG(j)/EWG(r)/EWT(1)/EWT(m)/FS(v)-3/EWG(v)/FCC/EEC-4/EEC(t)/T/  
EWG(a)-2/EWG(c)/EWA(h) Po-4/Pe-5/Pq-4/Pae-2/Pab/Pi-4 IJP(c) DD/RD/GW-2

ACCESSION NR: AP5009651

UR/0293/65/003/002/0325/0329

AUTHOR: Morozov, V. S.; Antipov, V. V.; Davydov, B. I.; Dobrov, N. N.;  
Saksonov, P. P.; Shashkov, V. S.

TITLE: The biological effect of cosmic radiation under conditions of onset of  
solar flares on the Earth-Moon route in model experiments

SOURCE: Kosmicheskiye issledovaniya, v. 3, no. 2, 1965, 325-329

TOPIC TAGS: cosmic radiation, biological effect, solar flare, solar flare model,  
gamma ray, Co<sup>60</sup>, mouse, radioprotector, radiation drug, lunar trajectory

ABSTRACT: The possibility of modeling the biological effect of ionizing radiation during short solar flare on a lunar spaceflight (7-10 days) is demonstrated in preliminary experiments. Co<sup>60</sup> is used as the radiation source because it has an equivalent RBE to a flow of protons, which cannot at present be simulated in the laboratory. Male white mice in a compartmented biological unit were supplied with special food concentrate and water for 5 days prior to irradiation by a dose of 900 r distributed to simulate solar flare in space flight. A second group on the same diet were exposed to an acute dose of 900 r in plexiglas cages. The number of deaths in 30 days was the same in both cases (75%). A third group, fed a normal

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L 38560-65

ACCESSION NR: AP5009651

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diet and also irradiated in plexiglas cages, had a 90% mortality rate in the same period of time. Pharmacologic and chemical defenses from the effect of radiation did not differ in principle in the model of simulated solar flare and under normal (i.e., acute) conditions of irradiation. Results of the experiment will be the subject of a further report. Orig. art. has: 3 figures and 2 tables. [JS]

ASSOCIATION: none

SUBMITTED: 01Dec64

ENCL: 00

SUB CODE: LS, A4

NO REF SOV: 004

OTHER: 006

ATD PRESS: 3225

Card *ee*  
2/2

L 0000-00 EWT(1)/EWT(M)/FS(V)-3 DD/RD  
 ACC NR: AP5026059 SOURCE CODE: UR/0293/65/003/005/0789/0795  
 AUTHOR: Davydov, B. I.; Antipov, V. V.; Konnova, N. I.; Saksonov, P. P.  
 ORG: none  
 TITLE: Radiobiological effects in animals after the preliminary action of acceleration  
 SOURCE: Kosmicheskiye issledovaniya, v. 3, no. 5, 1965, 789-795  
 TOPIC TAGS: radiation biologic effect, biologic acceleration effect, combined space flight effect, animal physiology, gamma ray, 660 Mev proton  
 ABSTRACT: The following indices of the combined effect on the animal organism of acceleration and irradiation were examined: survival percentage, the reaction of radio-sensitive organs (spleen and thymus), and some blood component levels. Male white mice were centrifuged (8-10 g for 15-30 min) 30 min, 4 hr, and 1 day prior to irradiation. One group of animals was irradiated with Co<sup>60</sup> gamma rays in a dose of 700 rad (dose power 9.5 rad/min) and the other with 660-Mev protons in a dose of 1300 rad. Experimental results showed that under the combined influence of acceleration and irradiation, the DL<sub>50/30</sub> was approximately 100 rad higher than with irradiation only. However, the average lifetime of the animals which died during the 30-day period after irradiation (with a dose of 750 rad) was shortened by previous acceleration. Statistically reliable differences were not observed in the average weights of the spleen and thymus of animals centrifuged and then irradiated. Radiation leukopenia  
 Card 1/2 UDC: 629.198.621+629.198.61 (59)

L 11400-66

ACC NR: AP5026059

with acceleration and ionizing radiation effects combined was less severe than with radiation alone. Several possible mechanisms of the modifying effect of acceleration on radiation injury are discussed. Experimental data still do not permit a complete evaluation of the acceleration effect on radiation injury depending on the time between these two influences. It should be noted that the weakening of the radiation effect observed with the preliminary influence of acceleration only concerns the period of acute radiation sickness and does not apply to all indices of radiation damage. Orig. art. has: 4 figures and 4 tables. [JS]

SUB CODE: LS/ SUBM DATE: 03Jun65/ ORIG REF: 007/ OTH REF: 007/ ATD PRESS: 4/26

Card 2/2

L 24238-66 EWI(m)

ACC NR: AP6014673

SOURCE CODE: UR/0241/65/010/010/0086/0087

REVIEWER: Saksonov, P. (Doctor of medical sciences)

ORG: none

TITLE: Review of 'Radioprotective effect of cyanide compounds' (Radiozashchitnoye deystviye tsianistykh soedineniy) by V. D. Rogozkin, B. P. Belousov, and N. K. Yevseyeva, Meditsina Publ. House, Moscow, 1963, 132 pp.

SOURCE: Meditsinskaya radiologiya, v. 10, no. 10, 1965, 86-87

TOPIC TAGS: radiation protection, pharmacology, drug effect, ionizing radiation, radiation sickness, pathogenesis

ABSTRACT: The authors of this book are highly erudite radiobiological experts, and it has come out of the laboratory of Prof. P. D. Gorizontov, the well-known authority on the pathogenesis, experimental therapy, and prophylaxis of radiation sickness. Prof. Gorizontov and his co-workers are credited with having been the first to consider amygdalin and to demonstrate the radioprotective properties of this substance. The book presents information on the physicochemical properties of amygdalin, methods of its production, and methods of its chemical identification, as well as with a description of the pharmacological effects of amygdalin -- its general effect and toxicity, its effect on the body temperature, respiration, and the cardiovascular system of animals, on their physical endurance and oxygen insufficiency, on diuresis, composition of the blood and urine, etc. -- based on studies of 1,600 mice, 1,030 rats, and 76 dogs. It is convincingly shown that, in the presence of minimum abso-

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UDC: 614.898.5:615.712.3(049.3)

L 24238-66

ACC NR: AP6014673

lutely lethal doses of radiation, amygdalin enhances the survivability of animals by 15-35% as compared with the controls. Of special interest are the findings presented on the potentiation by amygdalin of the protective effect of cystamine. On the other hand, the author's denigration of the protective effect of cystamine per se, based on improperly obtained findings, is to be deplored. Aside from this one flaw, the book is written at a high scientific level, in a clear and polished style, and is to be recommended not only to experimenters and clinicians who deal with ionizing radiation but also to the broad community of physicians. It is richly illustrated (16 figures, 30 tables) and contains an extensive bibliography (113 domestic and 139 foreign references). [JPRS]

SUB CODE: 06 / SUBM DATE: none

Card 2/2dda

SHASHKOV, V.I.; FEDOSYEV, V.M.; BURKOVSKAYA, T.Ye. SAKSONOV, P.P.;  
ANTIPIN, V.V.; YEVDOKIMOV, Yu.N.

Tests of newly synthesized thiazoline derivatives for radiation-  
protective activity. Farm. i toks. 28 no.6:737-738 N-D '65.  
(MIRA 19:1)

SHASHKOV, V.E.; PAKS, D. V. P.F.; ANDRUSOV, V.V.; RAZDOVOROV, D.L.; MORZOV, V.S.;  
MIRIN, G.F. (Moskva)

Cooperative radiation-protective effect of nicotinic and indolylalkyl  
amines in  $\gamma$ -irradiation and irradiation by 660 and 120 protons. Farm. i  
fiziol. 1986, 31:350-352. N.Y.-U.S.S.R. '86. (MIRA 18:8)

PARIN, V.V.; ANTIPOV, V.V.; RAUSHENBAKH, M.O.; JAKSONOV, P.P.; SHISHKOV, V.S.;  
CHERNOV, G.A.

Change in the concentration of serotonin in animal blood under  
the influence of ionizing radiation and the dynamic factors of  
space flight. Izv. AN SSSR Ser. bio. 30 no.1:3-9 Ja-F '65.  
(MIRA 18:2)



ANTIPOV, V.V., kand. med. nauk; NIKITIN, M.D.; SAKSONOV, P.P., doktor med. nauk

On the route from earth to moon; biological evaluation of the  
radiation danger of space flight. Priroda 54 no.4:46-53 Ap '65.  
(MIRA 18:5)

L 53048-65 EWG(j)/ENT(m)

ACCESSION NR: AP5014856

UR/0020/65/162/003/0688/0690

AUTHOR: Saksonov, P. P.; Antipov, V. V.; Shashkov, V. S.; Razgovorov, B. L.;  
Murin, G. P.; Morozov, V. S. 21/6

TITLE: The biological effect of high-energy protons 19

SOURCE: AN SSSR. Doklady, v. 162, no. 3, 1965, 688-690

TOPIC TAGS: high energy proton, RBE, chemical antiradiation agent, AET, cystamine, serotonin, 5 methoxytryptamine, mouse

ABSTRACT: The RBE of 120- and 660-Mev protons was determined for different biological objects, and the antiradiation effectiveness of certain chemicals was tested. The objects were irradiated from a synchrocyclotron with a pulsed proton beam (with specific ionization of approximately 6 and 20 ion pairs per  $1 \mu$  for 660- and 120-Mev protons, respectively). The dose power was 400-700 rad/min for 660-Mev protons and 80-100 rad/min for 120-Mev protons. Different tests [not described] concerned with vital activity and heredity were used to estimate the RBE of protons as compared to gamma rays. Experiments showed that the RBE of 660- and 120-Mev protons (according to LD<sub>50</sub> criteria) for rats and mice is 0.7, and that protons are somewhat less effective than gamma rays. Similar results were obtained by other experimenters.

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L 53048-65

ACCESSION NR: AP5014856

The antiradiation properties of various pharmacochemical substances were tested during irradiation with 120- and 660-Mev protons and also with gamma rays. Animals were injected intraperitoneally with the desired substance 15—20 min before irradiation with lethal doses. When AET, 5-methoxytryptamine hydrochloride, or serotonin creatine sulfate were injected into mice, 50—70% survived, and those that died lived longer than the unprotected animals. With cystamine dihydrochloride, 50% survived, and with tryptamine hydrochloride and 5-hydroxytryptophan, around 20% survived. The RBE of 120- and 660-Mev protons, as determined by these experiments on mice and rats, and by other experiments on fruit flies, seeds, and other biological objects, does not exceed 1. An RBE higher than 1 was observed for 510-Mev protons during experiments with dogs, and for 730-Mev protons with monkeys. The type of animal and the experimental methods used account for this difference. [JS]

ASSOCIATION: none

SUBMITTED: 31Jul64

NO REF SOV: 011

ENCL: 00

OTHER: 003

SUB CODE: LS

ATD PRESS: 4015

Card 2/2

ACC NR: AT6036632

SOURCE CODE: UR/0000/66/000/000/0335/0336

AUTHOR: Saksonov, P. P.; Antipov, V. V.; Dobrov, N. N.; Kozlov, V. A.; Shashkov, V. S.

ORG: none

TITLE: Problems of pharmacochemical protection of the organism against ionizing radiation on spaceflights [Paper presented at the Conference on Problems of Space Medicine held in Moscow from 24-27 May 1966]

SOURCE: Konferentsiya po problemam kosmicheskoy meditsiny, 1966. Problemy kosmicheskoy meditsiny. (Problems of space medicine); materialy konferentsii, Moscow, 1966, 335-336

TOPIC TAGS: radiation protection, pharmacology, ionizing radiation biologic effect, cosmic radiation biologic effect, life support system, radiation tolerance, space medicine

ABSTRACT:

Although some pharmacochemical substances have a demonstrated ability to increase the radioresistance of both humans and animals, they cannot be used unconditionally in spaceflight. Special features of the cosmic radiation effect which must be considered in the search for effective

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ACC NR: AT6036632

work capacity even briefly, and also must be available in convenient medicinal form. In addition, radioprotectors used in spaceflight must not damage the hereditary structures or disrupt the physiological functions of links in the spacecraft life-support system.

[W.A. No. 22; ATD Report 66-116]

SUB CODE: 06 / SUBM DATE: 00May66

Card 3/3

E 28144-66 EWT(1) SCTB DD

ACC NR: AP6015411

SOURCE CODE: UR/0216/66/000/003/0346/0354

AUTHOR: Gaydamakin, N. A.; Petrukhin, V. G.; Antipov, V. V.; Saksonov, P. P.; Shashkov, V. S.

ORG: none

TITLE: Pathomorphological changes in hematopoietic organs of mice during the combined action of certain types of ionizing radiation and dynamic spaceflight factors

SOURCE: AN SSSR. <sup>2</sup>Izvestiya. Seriya biologicheskaya, no. 3, 1966, 346-354

TOPIC TAGS: mouse, biologic acceleration effect, biologic vibration effect, radiation biologic effect, hematopoiesis, bone marrow, radiation injury, synergy

ABSTRACT: The synergistic effect of ionizing radiation and vibration or transverse acceleration on the spleen and bone marrow was investigated in 9 series of experiments on 245 male mice. In the 1st and 2nd series experimental animals were exposed to a 1-hr vibration (70 cps) period 1 or 3 days before proton irradiation with a 830 to 875 rad dose. In the 3rd and 4th series experimental animals were exposed to the same vibration period 3 or 5 days following irradiation. In the 5th series

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L 28444-66

ACC NR: AP6015411

experimental animals were exposed to the action of transverse acceleration applied 10 times over a 30 min period 23 hr before gamma irradiation with a 700 r dose, and in the 6th series the transverse acceleration action was applied 24 hr following irradiation. The 7th, 8th and 9th series served as controls. Animals were observed over a 60-day period to determine pathomorphological changes of the spleen and bone marrow by microscopic investigation. Study data show that the combined action of ionizing radiation and vibration or transverse acceleration markedly changes the degree and nature of pathomorphological shifts in hematopoietic organs. Exposure to vibration 3 days and particularly 1 day prior, to irradiation intensified the depletion of spleen and bone marrow and accelerated the restoration of all the hematopoietic processes. The effect of vibration applied 3 days and particularly 5 days after irradiation markedly increased destructive changes; during the recovery period necrotic foci appeared in the bone marrow and spleen, and reparative processes were prolonged. Transverse acceleration applied 24 hr prior to gamma irradiation reduced depletion of the hematopoietic organs and accelerated their reparation. Transverse acceleration applied 24 hr after irradiation did not affect radiation injuries of the hematopoietic organs. Orig. art. has: 6 figures. [06]

SUB CODE: 06/ SUBM DATE: none/ ORIG REF: 020/ ATD PRESS: 5005

Card 2/2 IC

L 37643-66 FSS-2/EWT(1)/EEC(k)-2/FCC/T SCIE TT/DD/JK/GW  
ACC NR: AP6024650 SOURCE CODE: UR/0216/66/000/004/0592/0593

AUTHOR: Zhukov-Verezhnikov, N. N.; Mayskiy, I. N.; Pekhov, A. P.;  
Rybakov, N. I.; Dobrov, N. N.; Antipov, V. V.; Kozlov, V. A.;  
Saksonov, P. P.; Podoplelov, I. I.

ORG: none

TITLE: Results of study of the effect of cosmic radiation and other  
spaceflight factors on lysogenic bacteria and human cell cultures  
[Paper presented at the Anniversary Symposium of the Institute of Bio-  
physics of the Czechoslovak Academy of Sciences held in Brno in May  
1965]

SOURCE: AN SSSR. Izvestiya. Seriya biologicheskaya, no. 4, 1966,  
592-593

TOPIC TAGS: spaceflight effect, radiation effect, Hela cell, lysogenic  
bacteria / Vostok 4 spacecraft, Vostok 6 spacecraft, Voskhod 1 spacecraft

ABSTRACT: Single-layer cultures of normal human cells (fibroblasts and  
amniotic cells) and human cancer cells (Hela strain), together with  
cultures of lysogenic bacteria (*E. coli* K-12), have been consistently  
used as radiation indicators on Soviet spacecraft. Results of these  
experiments have shown that repeated exposure of a culture of Hela cells  
to spaceflight factors on the Vostok-4 and Vostok-6 flights produced

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UDC: 629.195:577.391



L 37643-66

ACC NR: AP6024650

changes in experimental cells as compared with laboratory controls and with Hela cells exposed on one spaceflight only. A longer latent period of recovery of growth capacity and other characteristics [not named] were noted in twice-flown cultures. In addition, the coefficient of proliferation for Hela cells exposed on both Vostok-4 and Vostok-6 was one-half that for intact controls and for Hela cells exposed to spaceflight only once. These data suggest that spaceflight factors have a cumulative biological effect on human cell cultures. However, a direct dependence of biological effect on length of spaceflight exposure has not been established in experiments with the other radiation indicator, the lysogenic bacteria E. coli K-12 (λ). It is interesting to note that when the same Hela cells used on Vostok-4 and Vostok-6 were also exposed on Voskhod-1, a well-defined drop in the proliferation coefficient was observed in comparison with intact cultures. Experimental colonies were more compact, and there were more dead cells. Other reliable differences [not enumerated] were also found between intact controls and thrice-exposed cultures. However, no reliable differences could be detected between thrice-exposed Hela cells and a control strain used only on Vostok-6. It is suggested that the biological effect of spaceflight may be the result of the combined influence of radiation, vibration, and weightlessness. [JS]

SUB CODE: 06/ SUBM DATE: none/ ATD PRESS: 5046

Card 2/2 vmb

L 34975-66 EWT(1) SCTB DD/RD

ACC NR: AP6019602

SOURCE CODE: UR/0293/66/004/003/0482/0491

AUTHOR: Davydov, B. I.; Antipov, V. V.; Kozlov, V. A.; Saksonov, P. P.;  
Shashkov, V. S.

ORG: none

TITLE: The problem of using radioprotective pharmacological agents under spaceflight conditions

SOURCE: Kosmicheskiye issledovaniye, v. 4, no. 3, 1966, 482-491

TOPIC TAGS: manned spaceflight, radiation protection, cystamine,  
methoxytryptamine, acceleration, animal physiology

ABSTRACT: In tests on mice (exposed three times to 44.4 G, 1.4 G/sec accelerations, with 5 min per exposure and 5 min between exposures on a centrifuge with a 4.25 m arm length) and guinea pigs (exposed twice to 22.0 G, 0.7 G/sec with 5 min between exposures), lowered resistance to acceleration was noted after injections of cystamine (80-150 mg/kg), AET (15-150 mg/kg), 5-methoxytryptamine (75 mg/kg), serotonin (50 mg/kg), and aminazine (1-10 mg/kg). A change in resistance after injections of phenatine (2-10 mg/kg) and strychnine (0.05 mg/kg) was insignificant. Thirty min after the combined injection of phenatine (5-10 mg), strychnine (0.5-1.0 mg), and aminazine (2.5 mg), the EKG's and respiration of dogs exposed to 6-8 G (0.2-0.3 G/sec) did not differ from those of control centrifuged animals.

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UDC: 615.7.035.1:614.876(202)

L 34975-66

ACC NR: AP6019602

It was concluded that extreme caution should be exercised in recommending radio-protectors, especially AET, cystamine, and 5-methoxytryptamine, for use on space-flights. The authors thank S. N. Komarov for his active participation in the study. [CD]  
Orig. art. has: 5 figures and 3 tables.

SUB CODE: 06,22/ SUBM DATE: 28Feb66/ ORIG REF: 017/ OTH REF: 013/ ATD PRESS: 5029

Card 2/2 JS

L 03775-67 FSS-2/EWT(1)/EWT(m)/EEC(k)-2/FCC SCTB TT/DD/RD/GW  
 ACC NR: AP6028342 SOURCE CODE: UR/0293/66/004/004/0630/0633  
 AUTHOR: Volynkin, Yu. M.; Antipov, V. V.; Davydov, B. I.; Dobrov, N. N.;  
 Nikitin, M. D.; Pisarenko, N. F.; Saksonov, P. P.  
 ORG: none  
 TITLE: Assurance of radiation safety during the Voskhod-1 and Voskhod-2 flights  
 SOURCE: Kosmicheskiye issledovaniya, v. 4, no. 4, 1966, 630-633  
 TOPIC TAGS: space radiation, ~~radiation safety~~ spacecraft, solar flare prediction, radiation shielding, radiation dosimetry, nuclear emulsion, radiation ~~summary~~ EVA, lysogenic bacteria/Voskhod-1, Voskhod-2 spacecraft  
 ABSTRACT: The Voskhod-1 and Voskhod-2 flights were characterized by extremely high orbits (apogee 495 km). It was calculated that Voskhod-2 would have a far higher radiation exposure due largely to the proton component in the area of the Brazilian anomaly, where in the course of 20 min the spaceship would acquire about 80% of the daily dose. The extravehicular surface dose of electrons during 20 min could amount to 1 rad. In order to reduce this to zero a protective layer of 100 mg/cm<sup>2</sup> is required. Leonov's spacesuit fulfilled this shielding requirement. Since exposure to radiation may reach dangerous proportions during solar flares the following radiation protection measures were taken during the Voskhod-1 and Voskhod-2 flights. A preliminary study was made of radiation conditions on the proposed orbit. Forecasts  
 Card 1/3 UDC: 614.876(202)

L 03775-67

ACC NR: AP6028342

of the possibility of solar flares were made. The radiation dose was reduced by spacecraft shielding. Changes in the level of radiation in the upper atmosphere were checked by means of ballon sondes. Integral doses and dose rates were measured by on-board radiation meters. Individual dosimeters of the ILK, IKS, and IFKN types and nuclear emulsions were used to measure the total doses acquired by each cosmonaut. Living organisms were carried on board as biodosimeters. Radioprotective drugs were carried for emergency use by the cosmonauts. In order to determine the effect of low energy electrons during Leonov's EVA the two cosmonauts carried identical sets of dosimeters (on the chest under the spacesuit and in external hip pockets), which were capable of working in high-vacuum conditions. However, Leonov's dose did not exceed Belyayev's. Individual and on-board dosimeters indicated that the total dose received on Voskhod-2 was  $70 \pm 5$  mrad, while that on Voskhod-1 was  $30 \pm 5$  mrad. Analysis of the spectral composition of radiation made by nuclear emulsions indicated the presence of particles with linear energy losses comparable to ions of He, B, O, and Ar. The radiation dose, taking RBE into account, did not exceed several dozen ber. Biological objects carried on Voskhod-1 and Voskhod-2 showed increases in non-disjunction of chromosomes and increases in frequency of dominant lethal mutations in *Drosophila*, and disruption of the mitotic mechanism in microspores of *Tradescantia*; these increases, however, were small. Lysogenic bacteria carried on the two Voskhod flights did not show any effect of radiation or other spaceflight factors. Experiments performed by B. B. Yegorov have indicated that various stages of mitosis in *Tradescantia* microspores possess varying sensitivity to the effects of spaceflight factors. These findings confirmed Yegorov's hypothesis that the chief cause of

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L 03775-67

ACC NR: AP6028342

disruption of the mitotic mechanism is weightlessness and that chromosome reconstructions are due largely to combined factors related to spaceflight takeoff and reentry. Orig. art. has: 2 tables. [BM]

SUB CODE: 06/ SUBM DATE: 21Aug66/ ORIG REF: 006/ ATD PRESS: 5064

Card 3/3

L 03777-67 FSS-2/EAT(1)/EEC(K)-2/T SCIR II/004/004/004/0634/0640

ACC NR: AP6028343

SOURCE CODE: UR/0293/66/004/004/0634/0640

AUTHOR: Zhukov-Verezhnikov, N. N.; Mayskiy, I. N.; Delone, N. L.; Rybakov, N. I.; Kozlov, V. A.; Davydov, B. I.; Antipov, V. V.; Saksonov, P. P.; Rybakova, K. D.; Tribulev, G. P.

ORG: none

TITLE: Biological investigations on the Voskhod-1 and Voskhod-2 spaceships

SOURCE: Kosmicheskiye issledovaniya, v. 4, no. 4, 1966, 634-640

TOPIC TAGS: biologic spaceflight, ~~effect~~, ~~lysogenic~~ bacteria, ~~antiradiation~~, ~~radiation~~, ~~protective drug~~, ~~8-mercaptopropylamine~~, spaceflight, ~~fruit~~, ~~pin~~, wheat, ~~seed~~/ Voskhod 1, Voskhod 2 spacecraft

ABSTRACT: Experiments were performed on the Voskhod-1 and Voskhod-2 spaceships to test the effects of spaceflight on lysogenic cultures of *E. coli* K-12 ( $\lambda$ ). The cultures were carried in 1.5-ml ampules on board spaceships and in Leonov's spacesuit pocket during his EVA. Some of the ampules contained the radioprotective drug  $\beta$ -mercaptopropylamine. Controls were kept at the cosmodrome and at the home laboratory. Results showed that on the basis of viability there was no difference between samples carried on Voskhod-1 and the controls. Experiments on Voskhod-2 resulted in a slightly higher viability on the part of experimental cultures as compared to controls. Phage production of experimental cultures carried on the two flights also did

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UDC: 629.198.621:576.8

L 03777-67

ACC NR: AP6028343

0

not exceed phage production of controls. Thus, it was not possible to demonstrate the protective properties of  $\beta$ -mercaptopyrrolamine. An attempt was made to determine whether spaceflight sensitized lysogenic cultures of E. coli K-12 ( $\lambda$ ) to consequent exposure to small doses of x-rays. Results showed that phage production in space-flown samples was almost identical to that of the controls. In addition, air-dried seeds of pine and winter wheat (PPG-186) were carried on Voskhod-2 and in Leonov's pocket during his EVA for the purpose of determining the genetic effects of space-flight factors. Results did not reveal any substantial differences between the two spaceflight-exposed groups of seeds and the controls. It is assumed that the absence of the effects of spaceflight factors on lysogenic bacteria and seeds of higher plants in these two flights is due to the particular conditions under which these flights took place. Orig. art. has: 5 tables. [BM]

SUB CODE: 06/ SUBM DATE: 21Apr66/ ORIG REF: 013/ OTH REF: 002/ ATD PRESS: 5063

Card 2/2



L 23280-66 EWT(1)/EWT(m) ISCTB DD  
 ACC NR: AP6011437 SOURCE CODE: UR/0020/66/167/004/0925/0927  
 AUTHOR: Kozlov, V. A.; Saksonov, P. P.; Dobrov, N. N.; Antipov, V. V.;  
Parshin, V. S. 37  
 ORG: none B  
 TITLE: Altered resistance of animals exposed to vibration to the action  
 of some chemical preparations and physical load 2  
 SOURCE: AN SSSR. Doklady, v. 167, no. 4, 1966, 925-927  
 TOPIC TAGS: vibration, cystamine, strychnine, radiation protection,  
 combined stress  
 ABSTRACT: Two series of experiments were conducted on 449 white mice  
 weighing 20—24 g. In the first series, 240 mice were exposed to vi-  
 bration (70 cps, 0.4 mm, 10 G, 1 hr exposure), after which they were  
 given IP injections of cystamine chlorhydrate (400 mg/kg) or strychnine  
 (1.5 mg/kg) 20 min or 4 hr later. These preparations were selected  
 because they have a therapeutic effect for radiation sickness<sup>9</sup> or in-  
 juries and may be used on prolonged spaceflights, should severe radia-  
 tion conditions occur. It was established that the toxic action of  
 these drugs was elevated in vibrated animals. In the control group,  
 mortality was 45% for cystamine and 47% for strychnine. In the vibrated  
 Card 1/4 UDC: 629.198.61

L 23280-66

ACC NR: AP6011437

group, these values increased to 53.7% and 61.2% respectively, although a statistical examination of the data revealed that the difference was insignificant. This indicated that vibration affects the reactivity of the organism to these drugs. In the second series, the ability of control and vibrated animals to adapt to hexanol (100 mg/kg) was tested (65 mice). The preparation was IP injected after 15 min or 4 hr of vibration, as well as on a daily basis thereafter. Table 1 shows the re-

Table 1. Duration of the anesthetic effect of hexanol on control and vibrated mice (mean duration by group in min)

Experimental action	No. of mice	Days of hexanol injection				
		1st	2nd	3rd	4th	5th
Hexanol alone	31	115	50	29	31	32
15 min of vibration prior to 1st hexanol administration	18	106	32	28	22	80
4 hr of vibration prior to 1st hexanol administration	16	110	32	27	31	48

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L 23280-66

ACC NR: AP6011437

sults of this test. Three days after this test, the animals were given a toxic dose of strychnine (1.5 mg/kg) which was fatal for control mice in 50% of the cases. Mortality for animals which had been exposed to vibration 15 min or 4 hr prior to hexanol administration was 52% and 75%. For mice given hexanol alone, the mortality was 56%. The difference in mortality between these groups was found not to be statistically

Table 2. Swimming duration of control and experimental mice

Test no.	Experimental action	No. of mice	Swimming duration, min (M m)	Reliability		
				Rel. to test 1	Rel. to test 3	Rel. to test 4
1	Control	29	278 ± 12,0	—	—	—
2	Vibration, no cystamine	29	272 ± 9,5	0,4	—	—
3	Cystamine, no vibration	28	145 ± 6,0	10,4	—	—
4	Vibration plus cystamine	28	115 ± 4,8	12,6	3,9	—
5	Cystamine plus vibration	30	103 ± 7,0	12,6	4,5	1,4

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ACC NR: AP6011437

reliable. To test the effects of vibration and cystamine on the working ability of the organism, mice were exercised by swimming. Cystamine (225 mg/kg) was given either 15 min before or 15 min after vibration, whereupon the animals were placed in a tub of water (24±1C) until exhaustion occurred. Animals unable to swim for 1 hr were eliminated from this test. The results of this test are given in Table 2. These data show that vibration does not decrease working ability but that cystamine given before or after vibration does. Cystamine decreased the tolerance of the organism to exercise but statistically less so than when administered in combination with vibration. Orig. art. has: 2 tables. [CD]

SUB CODE: 06/ SUBM DATE: 29May65/ ORIG REF: 006/ ATD PRESS: 4231

Card

4/4

L 08280-67 -- EWT(1) SCTB DD/GD

ACC NR: AT6036477

SOURCE CODE: UR/0000/66/000/000/0030/0031

AUTHOR: Antipov, V. V.; Kozlov, V. A.; Davydov, B. I. Dobrov, N. N.;  
Razgovorov, B. I.; Saksonov, P. P.

31  
B4

ORG: none

TITLE: New data on changes in the reactivity of the organism under the effect of  
several spaceflight factors<sup>V</sup> [Paper presented at the Conference on Problems of  
Space Medicine held in Moscow from 24-27 May 1966]

SOURCE: Konferentsiya po problemam kosmicheskoy meditsiny, 1966. Problemy  
kosmicheskoy meditsiny. (Problems of space medicine); materialy konferentsii,  
Moscow, 1966, 30-31

TOPIC TAGS: space physiology, combined stress, biologic vibration effect, biologic  
acceleration effect, ionizing radiation biologic effect, rat, cystamine, strychnine,  
proton radiation biologic effect

ABSTRACT:

Experiments were performed to test changes in the reactivity of the  
organism which result from spaceflight factors (vibration, acceleration,  
ionizing radiation) and their combinations. The functional condition of the  
organism was evaluated using pharmacological and physical methods.

Cord 1/2

L 08280-67 -

ACC NR: AT6036477

It was found that vibration (70 cps at 10 G, for 1 hr) did not affect the stamina of the animal to physical exercise (swimming). The administration of cystamine (225 mg/kg) either before or after vibration caused a marked decrease in the duration of the swimming by the animal. Cystamine alone decreased the stamina of the organism during exercise, but to a significantly smaller degree than in combination with vibration. Vibration had the effect of moderately increasing the sensitivity of the organism to cystamine (400 mg/kg) and strychnine (1.5 mg/kg).

Four hours after exposure to acceleration (8 G, chest-back, for 20 min), a statistically significant drop in the physical stability of the animals was observed. On the seventh day after exposure stability increased. Changes in the reactivity of centrifuged animals with respect to physical exercise corresponded to shifts in the ceruloplasmin in the blood.

Forty days after exposure to protons (energy 120 Mev, doses from 700--1770 rad), the stability of animals to physical loads was lowered. Preliminary centrifugation (8 G for 15 min four hours prior to irradiation with doses of 400 and 700 rad) increased somewhat the resistance of animals to radiation. [W. A. No. 22; ATD Report 66-116]

SUB CODE: 06 / SUBM DATE: 00May66

Card 2/2 L

ACC NR: AT6036563

SOURCE CODE: UR/0000/66/000/000/0172/0173

AUTHOR: Zhukov-Verezhnikov, N. N.; Mayskiy, I. N.; Tribulev, G. P.; Rybakov, N. I.;  
Podoplelov, I. I.; Dobrov, N. N.; Antipov, V. V.; Kozlov, V. A.; Saksonov, P. P.;  
Parfenov, G. P.; Sharyy, N. I.

ORG: none

TITLE: Some results and trends in the study of the biological effect of cosmic radiation and dynamic flight factors using microbiological and cytological models  
[Paper presented at the Conference on Problems of Space Medicine held in Moscow from 24 to 27 May 1966]

SCURCE: Konferentsiya po problemam kosmicheskoy meditsiny, 1966. Problemy kosmicheskoy meditsiny. (Problems of space medicine); materialy konferentsii, Moscow, 1966, 172-173

TOPIC TAGS: manned space flight, space biologic experiment, tissue culture, lysogenic bacteria, cosmic radiation biologic effect, combined stress/Voskhod-1

ABSTRACT: Systems of lysogenic bacteria and single layer cultures of normal and cancer cells of man have been used on all spaceflights since the second orbital spaceship. This report presents the results of investigations performed on spaceships of the Vostok and Voskhod types. Biological experiments carried out on Vostok-3, -4, -5, and -6 indicate that phage production of lysogenic culture of E. coli K-12 increases with the duration of the flight. However, a direct linear relationship between the biological

Card 1/3

ACC NR: AT6036563

effect and the time of exposure in space was not established. The results obtained make it possible to assume that the biological effect in the above experiments depends on the combined effect of spaceflight factors, and specifically vibration, weightlessness, and radiation.

Ground experiments have indicated that the sensitivity of a lysogenic bacteria system to gamma irradiation ( $\text{CO}^{60}$ ) increases if the bacteria were previously exposed to vibration. These results not only confirm this supposition but make a more differentiated approach to evaluation of various spaceflight factors possible. However, in order to obtain a more complete picture of the genetic and radiation hazard of such flights, it is necessary to consider data obtained with more highly organized biological objects. Consequently, the results of spaceflight experiments performed with single-layer cultures of somatic human cells are of definite interest. In the series of experiments carried out on Vostok-1, -2, and -4, it was found that viability, and such indices as the coefficient of proliferation, the percentage of dead cells, and the morphological, antigenic, and cultural properties of the tissues, did not differ substantially from controls which were kept at the cosmodrome or the laboratory.

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ACC NR: AT6036563

However, when tissues were subjected to a second spaceflight (on Vostok-4, Vostok-6, and Voskhod-1), the twice-flown tissues showed a definite prolongation in the latent period of the ability to grow, as well as certain other noticeable changes. This makes it possible to surmise that spaceflight factors may have a cumulative effect on human tissue cultures. Further investigations of the biological effects of spaceflight utilizing lysogenic bacteria and tissues of various cultures are contemplated. [W.A. No. 22; ATD Report 66-116]

SUB CODE: 06, 22 / SUBM DATE: 00May66

Card 3/3

LEONTENKO, D. (g.Nikolayev); SAKSONOV, S. (g.Nikolayev)

"Excellent" say the specialists. Izobr.i rats. no.12:18 D '61.  
(MIRA 14:12)

1. Predsedatel' oblastnogo soveta Vsesoyuznogo obshchestva  
izobretateley i ratsionalizatorov (for Leontenko). 2. Zavednyushchiy  
promyshlennno-transportnym otделom gazety "Yuzhnaya pravda" (for  
Saksonov).

(Nikolayev---Research, Industrial)

KORBUT, B.A. (Zaporozh'ye); SAKSONOV, S.G. (Zaporozh'ye)

Stability of a cylindrical shell with an elastic filler subjected  
to axial compression. Prikl. mekh. 1 no.6:119-123 '65. (MIRA 18:7)

1. Zaporozhskiy mashinostroitel'nyy institut.

L 40325-66 ENT(d)/ENT(m)/ENP(w)/ENP(v)/ENP(k) IJP(c) EM/WW

ACC NR: AP6017825

SOURCE CODE: UR/0147/66/000/002/0038/0043

AUTHORS: Korbut, B. A.; Saksonov, S. G.

ORG: none

TITLE: The stability of a cylindrical shell with an elastic filler in the presence of external radial pressure

SOURCE: IVUZ. Aviatsionnaya tekhnika, no. 2, 1966, 38-43

TOPIC TAGS: cylindric shell structure, critical pressure, potential energy, Laplace operator, elastic modulus

ABSTRACT: The linear and nonlinear problems of the stability of a cylindrical shell with an elastic filler in the presence of an external radial pressure are examined. The linear equations of mildly sloping cylindrical shells

$$\frac{D}{h} \nabla^2 \nabla^2 w = \frac{1}{R} \frac{\partial^2 \Phi}{\partial x^2} + \frac{q}{h},$$

$$\frac{1}{E} \nabla^2 \nabla^2 \Phi = -\frac{1}{R} \frac{\partial^2 w}{\partial x^2},$$

are used. In the case of a radial external pressure, the external pressure  $q$  can be expressed as

$$q = -\sigma_y h \frac{\partial^2 w}{\partial y^2} - \alpha w,$$

Card 1/2

UDC: 539.3+629.13.012.2

L 40325-66

ACC NR: AP6017825

where  $\alpha_0$  is the "bed" coefficient of the filler in the subcritical state and  $\sigma_y$  is the surrounding normal stress in the body of the shell when it is pressed uniformly. It is found that the critical pressure increases with an increase in the rigidity of the filler. The nonlinear problem is solved by the Ritz method, where the total energy of the system

$$E = U_m + U_b + U_f - U_q,$$

where  $U_m$ ,  $U_b$ , and  $U_f$  are the potential energies of the middle surface, the bend, and the filler, and  $U_q$  is the potential of the external forces. The upper and lower pressures are found to increase with an increase in the rigidity of the filler. Orig. art. has: 34 formulas and 1 graph.

SUB CODE: 20/ SUBM DATE: 16Nov64/ ORIG REF: 003/ OTH REF: 003

Card 2/2 *MUP*

SAKSONOV, S.I.

Case of shock necrosis of the myocardium in a patient with peptic ulcer of the stomach and duodenum. Zdrav.Tadzh. 9 no.5:51-52 '62. (MIRA 15:12)

1. Iz Respublikanskoy klinicheskoy bol'nitsy (glavnyy vrach L.S.Obrubova). Nauchnyy rukovoditel' - zasluzhennyy deyatel' nauki Tadzhikskoy SSR.

(PEPTIC ULCER) (HEART---NECROSIS)

MESTER, I.M.; SAKSONOV, V.N.; GUMMEL', A.Ya.; SOKOLENKO, Yu.V.

Structural parameters and results of the industrial testing  
of telemetering apparatus for measuring methane concentrations  
in mine air. Nauch. trudy KNIUI no. 11:299-313 '62.  
(MIRA 17:7)

577

AUTHORS: Beletskiy, M.S. and Saksonov, Yu. G.

TITLE: Phases in the System  $\text{Na}_3\text{AlF}_6 - \text{Li}_3\text{AlF}_6$ . (Fazy v Sisteme  $\text{Na}_3\text{AlF}_6 - \text{Li}_3\text{AlF}_6$ .)

PERIODICAL: "Zhurnal Neorganicheskoy Khimii" (Journal of Inorganic Chemistry, Vol.11, No.2, pp.414-416. (U.S.S.R.), 1957

ABSTRACT: Although there are favourable prospects for the use of lithium compounds for intensifying the electrolytic production of aluminium, many of the corresponding physical-chemical effects which occur on fusing lithium and sodium cryolites have been insufficiently studied. There are serious discrepancies between the results of Drosspach<sup>3</sup> and those of Petrov<sup>4</sup>.

In the present investigation of the sodium cryolite-lithium cryolite system the melts were prepared by melting suitable mixtures in a shaft electric furnace. Since single crystals could not be obtained, powder X-ray methods were used for finding phase composition.

The investigation failed to confirm the existence in this system of a simple eutectic or a continuous series of solid solutions. On fusing sodium and lithium cryolites together three chemical compounds,  $\text{Li}_3\text{Na}_6\text{Al}_3\text{F}_{18}$ ,  $\text{Li}_6\text{Na}_3\text{Al}_3\text{F}_{18}$  and  $\text{Li}_{15}\text{Na}_3\text{Al}_6\text{F}_{36}$  were formed; the following eutectics were also

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Phases in the System  $\text{Na}_3\text{AlF}_6$  -  $\text{Li}_3\text{AlF}_6$ . (Cont.)

formed:  $\text{Na}_3\text{AlF}_6$  -  $\text{Li}_3\text{Na}_6\text{Al}_3\text{F}_{18}$ ;  $\text{Li}_3\text{Na}_6\text{Al}_3\text{F}_{18}$  -  $\text{Li}_6\text{Na}_3\text{Al}_3\text{F}_{18}$ ;

$\text{Li}_6\text{Na}_3\text{Al}_3\text{F}_{18}$  -  $\text{Li}_{15}\text{Na}_3\text{Al}_6\text{F}_{36}$ ;  $\text{Li}_{15}\text{Na}_3\text{Al}_6\text{F}_{36}$  -  $\text{Li}_3\text{AlF}_6$ .

There are six references, four of them Russian.

The references cited in the text of abstract are the following:

3. P. Drossbach, Z. Elektrochem, B.42, No.1, 65, 1936.

4. V.I. Petrov. Investigations of the main physical-chemical properties of a new electrolyte for the aluminium bath based on the partial replacement of sodium cryolite by lithium cryolite. Dissertation, VAMI, 1954.

1 Figure, 2 Tables.

The work was carried out at the All-Union Aluminium-Magnesium Research Institute.

Received 2 October, 1956.

Card 2/2

BELETSKIY, M.S.; GOPIYENKO, V.G.; SAKSONOV, Yu. G.

A new modification of  $Ti_3O_5$ . Zhur.neorg.khim. 2 no.9:2276-2278

S '57.

(MIRA 10:12)

(Titanium oxides)

20-6-29/59

AUTHOR: MASHOVETS, V.P., BELETSKIY, M.S., SAKSONOV, Yu. G., and SVOBODA, R.V.  
 TITLE: On a New Compound in the  $\text{NaF} - \text{AlF}_3$ .  
 (O novom soyedinenii v sisteme  $\text{NaF} - \text{AlF}_3$ . Russian).  
 PERIODICAL: Doklady Akademii Nauk SSSR, 1957, Vol 113, Nr 6, pp 1290 - 1292  
 (U.S.S.R.)  
 ABSTRACT: The diagram of the state of the fluorine-sodium-fluorinealuminium-system has often been studied since the cryolite formed on this occasion is the main component of the electrolyte which is used for the electrolytic winning of aluminium from its oxide. By earlier investigations it was found that in this system also chiolite develops besides cryolite (according to data:  $\text{Na}_5\text{Al}_3\text{F}_{14}$  or  $\text{Na}_3\text{Al}_2\text{F}_9$ ).  
 The conclusion concerning the sole existence of cryolite and chiolite was repeatedly confirmed in contrast to theoretical computations according to which an equimolecular compound:  $\text{MeAlF}_4$  is supposed to have the most stable aluminum configuration. The existence of such a compound with potassium as well as with univalent thallium and rubidium was already proved. Nothing is known about sodium compounds (with the exception of  $\text{NaAlF}_4 \cdot \text{H}_2\text{O}$ ) Apart from Howard, the authors obtained  $\text{NaAlF}_4$  in the condensate of the distillation vapors from cryolite-alumina-melting in an argon atmosphere at  $1200^\circ$ . The greatest quantities were found in vapors of meltings which had a molecular

Card 1/3

20-6-29/59

On a New Compound in the  $\text{NaF} - \text{AlF}_3$ .

ratio of  $\text{NaF} : \text{AlF}_3 = 1,67$  to 1.00. This is the domain which corresponds to the so-called "sour- electrolytes". It can be assumed that in normal conditions this compound is very unstable and is only partly conserved in the presence of argon and other gases. The interference-maxima of chiolite and fluorine aluminum were determined in radiograms. The not identified maxima left after their elimination which were characteristic of the crystal lattice of the new phase used for calculations. The obtained data were approximated to the constants of the known lattice of the compounds of the type  $\text{MeAlF}_4$ . Theoretical values of the intensities of the interference maxima<sup>4</sup> were calculated in order to find out whether sodium tetraaluminate has the same crystal lattice as the rubidium-, thallium-, and potassium compounds which are isomorphous with it. The obtained results show satisfactory agreement. Therefore it can be assumed that sodium tetrafluoralluminate has a similar crystal lattice as the aforementioned isomorphous compounds. Attention must be paid to some deviations of the theoretical intensity values from those obtained experimentally. A further still unknown compound may be concerned. Also a deformation of the tetrahedron of 6 fluorine atoms is possible. It is not impossible that just this is the reason for the instability of sodium-tetrafluoraluminate. An analogous lithium-compound is like-

Card 2/3

On a New Compound in the  $\text{NaF} - \text{AlF}_3$ .  
ly to be still more instable. (1 illustration, 5 Slavic references).  
20-6-29/59

ASSOCIATION: Allunion-Scientific Research Institute for Aluminum and Magnesium,  
Leningrad.  
(Vsesoyuznyy nauchno-issledovatel'skiy aluminiye-ve-magniyevyy  
institut, Leningrad).  
PRESENTED BY: FRUMKIN, A.N., Member of the Academy.  
SUBMITTED: 7 January 1956  
AVAILABLE: Library of Congress

Card 3/3

5(4)

AUTHORS: Beletskiy, M. S., Saksonov, Yu. G.

SOV/78-4-5-4/46

TITLE: Radiographic Investigation of the Polymorphous Conversion of Sodium Aluminate (Rentgenograficheskoye issledovaniye polimorfnogo prevrashcheniya alyuminata natriya)

PERIODICAL: Zhurnal neorganicheskoy khimii, 1959, Vol 4, Nr 5, pp 972-974 (USSR)

ABSTRACT: The radiographic investigation of sodium aluminate was carried out at temperatures of up to 1200°C. The X-ray pictures taken are shown by figure 1 (a-d). It was found that by the heating of sodium aluminate a new phase develops temporarily, which again goes over into sodium aluminate after cooling down. The phase of high-temperature stability has cubic lattices. The phase of low-temperature stability, however, has a tetragonal modification. The polymorphous conversion occurs at 450°. The lattice constants of the tetragonal and cubic modifications of the sodium aluminate were determined (Tables 1, 2). There are 1 figure, 2 tables, and 3 references, 2 of which are Soviet.

Card 1/2

~~6928~~ 69528

S/078/60/005/05/01/037  
B004/B016

5.1190  
5.2100  
AUTHORS:

Biryukova, L. V., Saksonov, Yu. G.

TITLE:

Investigation of the Products of Interaction Between Metallic  
Titanium and Titanium Tetrachloride

PERIODICAL:

Zhurnal neorganicheskoy khimii, 1960, Vol. 5, No. 5,  
pp. 993-998

TEXT: This paper was induced by the industrial development of titanium production, its purpose was the study of the subchlorides formed in the thermal or electrolytic preparation of titanium metal. The authors describe the experimental device (Fig. 1) in which porous titanium was allowed to react with  $TiCl_4$  at 300 - 1000° under rigorous exclusion of air, and the analysis for Ti and Cl in the reaction products carried out under the same conditions. Also the hydrogen quantity liberated on reaction of the titanium chlorides with water was measured in order to verify the results obtained. The data of analysis are summarized in table 1 and indicate the following: At 300° almost no reaction is observable between Ti and  $TiCl_4$ . At 400°  $TiCl_3$  ✓

Card 1/2

Investigation of the Products of Interaction  
Between Metallic Titanium and Titanium  
Tetrachloride

45928 695-28  
S/O78/60/005/05/01/037  
B004/B016

is formed, at  $500^{\circ}$   $\text{TiCl}_2 + \text{TiCl}_3$ , at  $700^{\circ}$  and above again  $\text{TiCl}_2 + \text{TiCl}_3$ . In this connection the trichloride sublimes, and the dichloride remains in the reaction zone. An X-ray structural analysis was made in argon atmosphere. The X-ray pictures of the reaction products show four structures: a) metallic unreacted titanium; b,c) two modifications of  $\text{TiCl}_2$  (denoted  $\text{TiCl}_{2-1}$  and  $\text{TiCl}_{2-2}$ ), and d) the  $\alpha$ -modification of  $\text{TiCl}_3$ . It was found experimentally that first always  $\text{TiCl}_{2-1}$  is formed which at temperatures above  $600^{\circ}$  is converted to give  $\text{TiCl}_{2-2}$ , the structure of which remains stable on subsequent cooling. Table 2 gives the radiographic data of the titanium chlorides and compares them with the data of Refs. 1-3,5,6. There are 1 figure, 2 tables, and 6 references, 1 of which is Soviet. ✓

SUBMITTED: February 5, 1959

Card 2/2



BELETSKIY, M.S.; SAKSONOV, Yu.G.

Letter to the editor. Zhur.nerog.khim. 5 no.5:1183  
My '60. (MIRA 13:7)  
(Sodium aluminate)

SAKSONOV, Yu. G.

S/070/63/008/001/005/024  
E132/E460

AUTHORS: Konakhovich, Yu. Ya., Saksonov, Yu. G.

TITLE: Neutron diffraction investigation of a manganese-zinc ferrite

PERIODICAL: Kristallografiya, v.8, no.1, 1963, 25-31

TEXT: The study had the aim of finding the positions of the ions and of explaining the magnetic structure in the ferrite of composition  $Zn_{0.288}Mn_{0.645}Fe_{2.067}O_4$ . Neutron diffraction was carried out at 20°C with and without a magnetic field of 5000 Oe and at 260°C. X-ray diffraction gave the unit cell dimensions as  $a = 8.4915 \pm 0.0005$  Å. The neutron beam used was monochromatized by reflection from 111 of a Pb crystal to 0.962 Å. The Curie point of the specimen was 230°C. It was shown that the parameter of the oxygen ions is  $u = 0.3881 \pm 0.0008$  and that the degree of inversion is  $s = 0.89 \pm 0.05$ . The ferrite shows anti-parallel ordering of the magnetic moments of cations in the octahedral and in the tetrahedral interstices. The saturation magnetic moment per ion for the ions in the tetrahedral and octahedral positions is  $3.3 \pm 0.3$  Bohr magnetons and is  $3.3 \pm 0.9$  for a "molecule", which corresponds exactly with the value

Card 1/2

Neutron diffraction ...

S/070/63/008/001/005/024  
E132/E460

determined by magnetic measurements at room temperature. Comparison with the calculated values show that the tetrahedral and octahedral sub-lattices are saturated at room temperature to different degrees (94 and 68% respectively). There are 2 figures and 1 table.

ASSOCIATION: Institut atomnoy energii im. I.V.Kurchatova  
(Institute of Atomic Energy imeni I.V.Kurchatov)

SUBMITTED: June 26, 1962

Card 2/2

L 55031-65 EWT(1)/EWT(m)/ENP(w)/EPF(c)/EWA(d)/EPR/T/ENP(t)/EED-2/ENP(b)/EWA(c)  
Pr-4/Pr-4 LJP(c) JD/JW

ACCESSION NR: AP5009376

UR/0363/65/001/002/0246/0253 37  
541.123.34 35  
B

AUTHOR: Oleynikov, N. N.; Saksonov, Yu. G.; Tret'yakov, Yu. D.

TITLE: Phase equilibria in the magnesium oxide-ferrous oxide-ferric oxide system at 1400°C.

SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 1, no. 2, 1965, 246-253

TOPIC TAGS: magnesium oxide, ferrous oxide, ferrite phase diagram, ferric oxide, phase equilibrium, ternary ferrite system

ABSTRACT: The purpose of this work was to extend the measurements of phase equilibria in the  $MgO-FeO-Fe_2O_3$  ferrite system to higher temperatures and to determine the possibility of the existence of nonstoichiometric ferrite, using the independent dynamic method for the achievement of equilibrium. The chemical analysis of condensed phases and measurements of lattice parameters yielded data to explain the effect of thermal treatment on the magnetic and crystallographic properties of magnesium ferrite and of ferrite-magnetite solid solutions. The study of the

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L 55031-65

ACCESSION NR: AP5009376

1400°C isothermal cross-section in the  $\text{MgO-FeO-Fe}_2\text{O}_3$  system at variable pressures of oxygen above the solution is shown in fig. 1 of the Enclosure. As the divalent iron is replaced by  $\text{Mg}^{+2}$  the spinel solid solution area narrows. The fact that the spinel composition is independent of the partial pressure of  $\text{O}_2$  in the gas phase is a result of the formation of a defect structure with interstitial  $\text{Mg}^{+2}$  ions. This is supported by data from chemical analysis, x-ray diffraction analysis and electrical conductivity measurement. The solid phase  $\text{MgFe}_2\text{O}_4$  of stoichiometric composition is thermodynamically unstable and it decomposes into nonstoichiometric ferrite and hematite. Orig. art. has: 6 figures and 2 tables.

ASSOCIATION: Khimicheskiy fakul'tet Moskovskogo gosudarstvennogo universiteta im. N. V. Lomonosova (Chemistry Department, Moscow State University)

SUBMITTED: 20Jul64

ENCL: 01

SUB CODE: IC, MM

NO REF SOV: 004

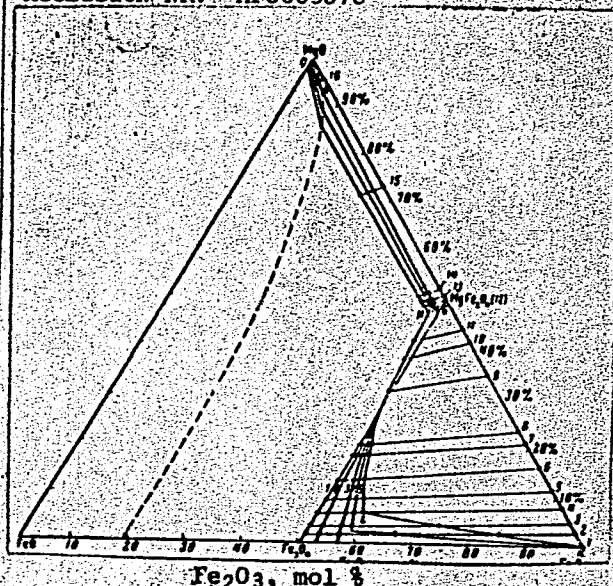
OTHER: 017

Card 2/3

L-55031-65

ACCESSION NR: AP5009376

0



ENCLOSURE: 01

1- $P_{O_2} = 10^{-3}$  atm

2- $P_{O_2} = 2 \cdot 10^{-2}$  atm

3- $P_{O_2} = 0,21$  atm

4- $P_{O_2} = 0,66$  atm

5- $P_{O_2} = 1$  atm

isothermal slice at 1400°C across  
MgO-FeO-Fe<sub>2</sub>O<sub>3</sub> system

card 3/3

KOMAROV, V.A.; OLEFNIKOV, N.N.; GAKSONOV, Yu.G.; TRET'YAKOV, Yu.D.

Solid solutions with spinel structure in the system iron -  
magnesium - oxygen. Izv. AN SSSR. Neorg. mat. 1 no.3:395-  
404. Mar '65. (MIRA 18:6)

1. Moskovskiy gosudarstvennyy universitet imeni Lomonosova,  
Khimicheskiy fakul'tet.

L 54995-65 EWG(j)/EWI(m)/EPP(c)/EPR/T/EWP(t)/EWP(u)/EWA(c) Pr-4/Ps-4 IJP(c)

JD/JW

ACCESSION NR: AP5011937

UR/0363/65/001/003/0395/0404  
541.123+546.72+546.711+546.21

AUTHOR: Komarov, V. F.; Oleynikov, N. N.; Saksonov, Yu. G.; Tret'yakov, Yu. D.

TITLE: Investigation of solid solutions with apinel structure in the iron-manganese-oxygen system

SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 1, no. 3, 1965, 395-404

TOPIC TAGS: solid solution, spinel, iron, manganese, manganese ferrite

ABSTRACT: The object of the study was to determine the equilibria between the iron-manganese spinels and gaseous oxygen at 1400°C and to estimate the thermodynamic properties of  $Mn_{1-x}Fe_xO_4$  solid solutions on the basis of the experimental data. Highly homogeneous and pure mixtures of manganese and iron oxides were prepared by thermal decomposition of solid solutions of schoenite type salts  $(Mn_{1-x}Fe_x)SO_4 \cdot (NH_4)_2SO_4 \cdot 6H_2O$ . The spinel-oxygen equilibria were obtained by passing an oxygen containing gas ( $O_2$  partial pressures: 0.001 atm, 0.21 atm, and 1 atm)

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L 54995-65

ACCESSION NR: AP5011937

for 4 hours at a rate of 1 cm/sec through a 0.4 to 0.5 gram spinel sample placed in a furnace at 1400°C. The compositions of the  $Mn_xFe_{3-x}O_4 + \gamma$  systems were characterized only by the values of  $x$  and  $\gamma$ . Manganese-rich solid solutions ( $x > 1$ ) were dissolved in Mohr salt containing HCl solutions and the excess of Mohr salt was determined by potentiometric titration with Ce (IV) sulfate. The " $\gamma$ " parameter was determined from equation:

$$\gamma = \frac{1}{2} \cdot \frac{1-x-kM}{1-8k}$$

where;  $k$  is the number of gram equivalents of  $Fe^{2+}$  ions in 1 gram of dissolved solid phase;  $M$  is the molecular weight of  $Mn_xFe_{3-x}O_4$ . For solid solutions containing  $Mn^{3+}$  ions along with  $Mn^{2+}$  and  $Fe^{3+}$ ,  $\gamma$  was determined from equation:

$$\gamma = \frac{1}{2} \cdot \frac{1+x-lM}{1-8l}$$

where  $l$  is the number of gram equivalents of  $Mn^{3+}$  ions in 1 gram of dissolved solid phase. The " $x$ " parameter was determined experimentally as a function of  $\gamma$  [ $\gamma = f(x)$ ] for all three partial pressures of oxygen in the gas phase. For each

Card 2/3

L 54995-65

ACCESSION NR: AP5011937

series of solid solutions (obtained at different  $O_2$  partial pressures) the lattice parameters  $a$  (in Å) and ratios of lattice parameters  $c/a$  were determined by x-ray technique. For each component of the spinel phase of the  $MnFe_2O_4$ - $Fe_3O_4$ - $Fe_2O_3$  and  $MnFe_2O_4$ - $Fe_3O_4$ - $O$  systems the thermodynamic properties (molar free energies) were determined from experimental data using a simplified statistical model and the Gibbs-Duhem equation. It was established that at oxygen pressures lower than 1 atm the solid solution of manganese ferrite, magnetite and  $\gamma$ -iron oxide, and also  $MnFe_2O_4$ - $Fe_3O_4$ -oxygen solid solutions are close to ideal. Orig. art. has: 4 tables, 4 figures, and 2 formulas.

ASSOCIATION: Khimicheskiy fakultet Moskovskogo gosudarstvennogo universiteta im. M. V. Lomonosova (Department of Chemistry, Moscow State University)

SUBMITTED: 25Jul64

ENCL: 00

SUB CODE: MM, SS

NO REF SOV: 003

OTHER: 018

Card 3/3

L 54997-65 EWG(j)/EWT(l)/EWT(m)/EPF(c)/EPF(n)-2/EPR/T/EWP(t)/EEG(b)-2/EWP(b)/  
EWA(c) Pr-l/Pr-l/Pu-l/Pi-l IJP(c) JD/WJ/JW/JG/GG

ACCESSION NR: AP5011939

UR/0363/65/001/003/0408/0412  
546.723'711'21:548.19

AUTHOR: Tret'yakov, Yu. D.; Saksonov, Yu. G.; Gordeyev, I. V.; Zayonchkovskiy, Ya. A.; Gordina, A. M.

TITLE: Correlation between dissociation pressure and crystal lattice parameters of manganese-containing multicomponent ferrites

SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 1, no. 3, 1965, 408-412

TOPIC TAGS: manganese ferrite, dissociation, thermal stability, lattice parameter

ABSTRACT: An attempt was made to correlate the dissociation pressure of the solid solution ( $MnFe_{3-x}O_4$ ) and the lattice parameter  $a$  on the basis of thermodynamic and x-ray data. The object of the study was to develop a method of predicting thermal stability of manganese-containing multicomponent ferrites, materials widely used in the electronic industry and purification technology. Several solid solutions of  $MnFe_{3-x}O_4$  ( $0 \leq x \leq 3$ ) containing  $MgO$ ,  $ZnO$ , and  $CaO$  were prepared by fusing mixtures of these oxides for 5 hours at  $1000^\circ C$ . Dissociation pressures for several

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L 54997-65

ACCESSION NR: AP5011939

Mn Fe<sub>3</sub> O<sub>4</sub> solid solutions and mixtures of ferrites were measured in the 800-1200°C temperature range. There is an irregularity between composition and the change of lattice parameter  $\alpha$  of the solid solutions of magnetite (Fe<sub>3</sub>O<sub>4</sub>) and hausmannite (Mn<sub>3</sub>O<sub>4</sub>). This irregularity is due to interchangeable replacement of iron in magnetite with Mn<sup>2+</sup> and Mn<sup>3+</sup> ions. In the 800-1100°C temperature range there is a correlation between the dissociation pressure of the manganese-containing multicomponent ferrites and the crystal lattice parameter  $\alpha$ . This correlation is independent of the nature of complementary components present in the manganese-containing ferrite. For the Fe<sub>3</sub>O<sub>4</sub>-MnFeO<sub>4</sub> system, the lattice parameter  $\alpha$  increases in proportion to replacement of Fe<sup>3+</sup> ions ( $r = 0.67 \text{ \AA}$ ), in Fe<sup>3+</sup>[Fe<sup>2+</sup>Fe<sup>3+</sup>]O<sub>4</sub> tetrahedra with Mn<sup>2+</sup> ions ( $r = 0.91 \text{ \AA}$ ). In the MnFe<sub>2</sub>O<sub>4</sub>-Mn<sub>3</sub>O<sub>4</sub> system, the changes in the lattice parameter  $\alpha$  are small since Fe<sup>3+</sup> ions in the Mn<sup>2+</sup>[Fe<sub>2</sub><sup>3+</sup>]O<sub>4</sub> octahedral spinel units are replaced with Mn<sup>3+</sup> ions ( $r = 0.70 \text{ \AA}$ ). Orig. art. has: 2 tables and 3 figures.

ASSOCIATION: Khimicheskiy fakul'tet Moskovskogo gosudarstvennogo universiteta im. M. V. Lomonosova (Department of Chemistry, Moscow State University)

SUBMITTED: 01Feb64

ENCL: 00

SUB CODE: EC, SS

NO REF SOV: 006

OTHER: 008

Card 2/2

SAKSONOV, Yu.G.; SOMENKOV, V.A.

Relationship between the lattice constant of spinel with cation  
distribution and oxygen parameters. Fiz. met. i metalloved. 18  
no.6:853-857 D '64. (MIRA 18:3)

L 54999-65 EWG(j)/EWT(m)/EPF(c)/EPR/T/EWP(t)/EWP(b)/EWA(c) Pr-4/Ps-4 IJP(c)

ACCESSION NR: AP5011940 JD/JW

UR/0363/65/001/003/0413/0410

546.123+546.723-31+546.722-31+

546.713'712+546.712-31

AUTHOR: Tret'yakov, Yu. D.; Saksonov, Yu. G.; Gordeyev, I. V.

TITLE: Phase diagram of the  $\text{Fe}_3\text{O}_4$ - $\text{Mn}_3\text{O}_4$ - $\text{MnO}$ - $\text{FeO}$  system at 1000°C

SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 1, no. 3, 1965, 413-418

TOPIC TAGS: iron oxide, manganese oxide, thermodynamic property, mixed oxide

ABSTRACT: The phase diagram of the  $\text{Fe}_3\text{O}_4$ - $\text{Mn}_3\text{O}_4$ - $\text{MnO}$ - $\text{FeO}$  system (see fig. 1 of the Enclosure) was studied at 1000°C by means of emf measurements and x-ray phase analysis. Samples of general formula  $\text{Me}_3\text{O}_4$  were prepared by fusing mixtures of  $\text{MnO}$ , wüstite,  $\text{Mn}_3\text{O}_4$ , hausmannite,  $\text{Fe}_3\text{O}_4$  (magnetite), and iron carbonyl in various proportions. The mixtures were pressed into tablets (10 tons/cm<sup>2</sup>), heated at 1000°C for 8 days, and quenched. The equilibrium oxygen pressure over the fused phase was determined by measuring the electromotive force of a galvanic cell involving the phases under study. The activities of magnetite ( $a_m$ ) and hausmannite ( $a_h$ ) in a  $\text{MnFe}_3\text{O}_4$  spinel were determined from the equilibrium data. The free energy of

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ACCESSION NR: AP5011940

formation of various  $Mn_xFe_{3-x}O_4$  spinels were calculated from the equation:

$$\Delta G = RT(N_m \ln a_m + N_h \ln a_h);$$

where:  $N_m$  and  $N_h$  are the numbers of moles of magnetite and hausmannite in the spinel, respectively. Pure iron oxide (FeO) has a defect structure characteristic of cation vacancies and ions with higher valence state ( $Fe^{3+}$ ). Concentration of the  $Fe^{3+}$  ions is a function of both temperature and partial pressure of oxygen in the gas phase above the solid solution. In the solid solution of wüstite with hausmannite, the concentration of cation vacancies depends also upon the manganese content. The degree of structure imperfection in wüstite in equilibrium with a spinel phase was calculated. Orig. art. has: 3 tables, 5 figures, and 4 formulas.

ASSOCIATION: Khimicheskiy Fakultet Moskovskogo gosudarstvennogo universiteta  
(Department of Chemistry, Moscow State University)

SUBMITTED: 05May64

ENCL: 01

SUB CODE: IC, SS

NO REF SOV: 005

OTHER: 005

Card 2/3



L-54999-65  
ACCESSION NR: AP5011940

ENCLOSURE: 01

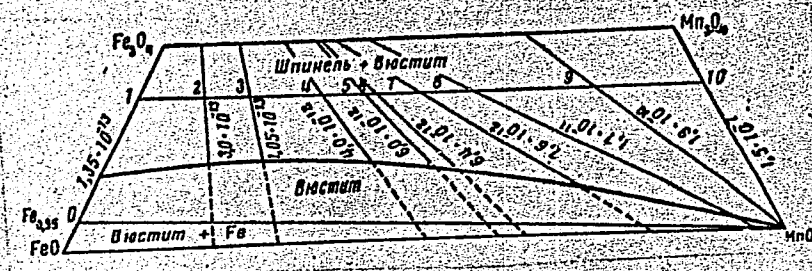


Fig. 1. Phase diagram of the  $\text{Fe}_3\text{O}_4$ - $\text{Mn}_3\text{O}_4$ - $\text{MnO}$ - $\text{FeO}$  system at  $1000^\circ\text{C}$ .

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L 21221-66 EWT(m)/EWP(t) IJP(c) JD

ACC NR: AP6003811

SOURCE CODE: UR/0181/66/008/001/0269/0272

AUTHORS: Vinnik, M. A.; Erastova, A. P.; Saksonov, Yu. G.

ORG: none

TITLE: Investigation of the cation distribution in barium  
hexaferrites 27 38  
B

SOURCE: Fizika tverdogo tela, v. 8, no. 1, 1966, 269-272

TOPIC TAGS: barium compound, ferrite, magnetic moment, crystal symmetry, cation, x ray analysis, saturation magnetization

ABSTRACT: The investigated substance  $Ba_2Me_2^{2+}Fe_{12}^{3+}O_{22}$  ( $Me^{2+}$  stands for Co, Ni, Zn, Cu, Mg, and other metals) has exhibited in various experiments a magnetic moment which differs appreciably from those calculated theoretically by various authors under the assumption that the  $Me^{2+}$  ions are located in the spinel blocks of the ferrite structure (E. W. Gorter, Proc. IEE, 104B, Suppl. No. 5, 255, 1957). It is shown, however, that the calculated values and the experimental values

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ACC NR: AP6003811

of the magnetic moment are in better agreement if it is assumed that Gorter's hypothesis is in error and that the  $\text{Me}^{2+}$  and  $\text{Fe}^{3+}$  are statistically distributed over the S and T blocks in both tetrahedral and octahedral positions. The cation distribution in the barium hexaferrite, obtained from the measurements of the specific saturation magnetization by the Weis method (P. Weis, Arch. sci. phys. nat. v. 29, 175, 1910) is then compared with the cation distribution obtained by x-ray structure analysis and the two are shown to be in agreement within the limits of experimental accuracy. The formulas for the cation distributions are tabulated for these ferrites with Mg, Zn, Co, Cu, Mn, and Ni. The dependence of the results on the quenching and cooling of the ferrite is briefly discussed. The data show in addition that in hexaferrites, as in spinels, the  $\text{Ni}^{2+}$  and  $\text{Co}^{2+}$  have an affinity to octahedra, while the ions  $\text{Zn}^{2+}$  and  $\text{Mn}^{2+}$  to tetrahedra. Orig. art. has: 2 formulas and 2 tables.

SUB CODE: 20/ SUBM DATE: 30Jul65/ ORIG REF: 002/ OTH REF: 004

Card 2/2 *ds*

ACC NR: AP7005682

SOURCE CODE: UR/0413/67/000/002/0156/0156

INVENTOR: Saksonov, Z. A.; Sankov, Ye. I.; Skopinov, A. P.; Shushpanov, Ye. A.

ORG: None

TITLE: An airtight hatch. Class 62, No. 190785

SOURCE: Izobreteniya, promyshlennyye obraztsy, tovarnyye znaki, no. 2, 1967, 156

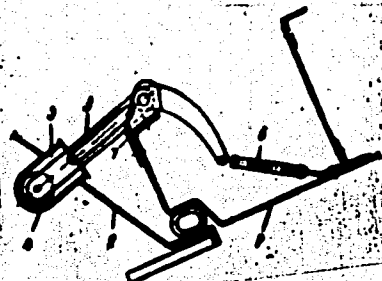
TOPIC TAGS: mechanical fastener, hermetic seal, auxiliary aircraft equipment, aircraft cargo handling

ABSTRACT: This Author's Certificate introduces: 1. An airtight hatch with possible application in an aircraft luggage carrier. The installation contains a frame with a cover which is opened by sliding it into the compartment and upward along its inner surface. The design also incorporates an elastic hermetic sealing element, guide rails and guide rollers fastened to the cover. Guide support pins are hinged to the lower edge of the cover to facilitate sliding into and out of the frame opening without bending and jamming. The free end of each pin is equipped with a roller which slides into a matching socket installed in the frame. 2. A modification of this hatch in which the guide support pins are spring loaded in the direction of motion of the hatch cover during closing. The pins come up against stops mounted in the cover when they reach the position at which the roller will slide into the socket.

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UDC: 629.13.012.21

ACC NR. AP7005682



1—hatch cover; 2—hatch frame; 3—pin; 4—roller; 5—socket; 6—spring; 7—stop  
SUB CODE: 13/ SUBM DATE: 158ep65

Cord 2/2

ROMACHEVA, I.F., kand.med.nauk; SAKSONOVA, Ye.A.

Systemic diseases of the salivary and lacrimal glands (Sjögren's syndrome). Stomatologiya 38 no.3:13-16 My-Je '59.

(MIRA 12:8)

1. Iz kafedry propedevtiki khirurgicheskoy stomatologii (zav. - dotsent G.A.Vasil'yev), kafedry glaznykh bolezney (zav. - prof. Z.A.Kaminskaya) Moskovskogo meditsinskogo stomatologicheskogo instituta (dir. - dotsent G.N.Beletskiy) i Moskovskogo chelyustno-litseвого gosпитalya (glavnyy vrach - dotsent A.A.Kovner).

(SALIVARY GLANDS--DISEASES) (LACRIMAL ORGANS--DISEASES)

KATSNEL'SON, L.A., kand.med.nauk; SAKSONOVA, Ye.O.; BASHLYKOVA, Ye.N.

On malignant exophthalmos. Sov.med. 23 no.9:100-104 S '59. (MIRA 13:1)

1. Iz kafedry glaznykh bolezney (zav. - prof. Z.A. Kaminskaya-Pavlova) Moskovskogo meditsinskogo stomatologicheskogo instituta (dir. - dot-sent G.N. Beletskiy) i Tsentral'nogo instituta glaznykh bolezney imeni Gel'mgol'tsa (dir. A.V. Roslavytsev).  
(HYPERTHYROIDISM compl.)

SAKSONOVA, Ye.O.

Changes in the crystalline lens in experimental atherosclerosis. Uch.zap. GNII glaz.bol. no.8:49-54'63. (MIRA 16:9)

1. Gosudarstvennyy nauchno-issledovatel'skiy institut glaznykh bolezney imeni Gel'mgol'tsa.  
(CRYSTALLINE LENS) (ARTERIOSCLEROSIS)

SAKSONOVA, Ye.O.

Study of the effectiveness of fonurit for the prevention of hemorrhages in the anterior chamber following a cataract extraction. Uch. zap. GNII glaz.bol. no.8:101-106'63.

(MIRA 16:9)

1. Gosudarstvennyy nauchno-issledovatel'skiy institut glaz-nykh bolezney imeni Gel'mgol'tsa.

(THIADIAZOLESULFONAMIDE) (CATARACT)  
(HEMORRHAGE)